

Appendix

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This invention relates generally to road surface removal or reclaimer-stabilizer equipment and mining equipment and more particularly to bit assemblies including bits, bit holders and bit blocks that are more efficient in their cutting and passage of the cut material around the bit assembly. This is a continuation-in-part of Ser. No. 09/500,983 filed February 15, 2000, now U.S. Patent No. 6,341,567 issued April 16, 2002.

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Aft of the base 40 of the conical front portion of bit holder 18 is the shank 41. The shank portion 41 includes an upper shoulder 42 which is slightly larger diameter than the middle shank portion 41, and a second enlarged portion 42a of shank 41 immediately adjacent the distal end 43 thereof. A slot, whose forward end is indicated at 44 extends from the end of upper shoulder portion 42 [32] through the distal end 43 of the shank 41 thus providing a C-shape for the perimeter of the shank 41 allowing it to expand and contract diametrically for a force fit into the bit block, generally indicated at 20. A pin 45 is mounted in a bore 46 180 degrees around shank 41 from the slot 44. The pin 45 assures that the spacer 17 will not fall out of the bottom of bit holder bore 36 in the bit holder 18 when it is mounted therein.

In another important aspect of the present invention, the bit block 20 includes a base mounting portion 47 having a base 48 which is mountable on the outside of a drum (not shown) which is a part of road milling equipment. The front or leading portion of the mounting section 47 includes a pair of rearwardly angled shoulders 50-50 (only one shown). Adjacent the mounting section 47 which holds the bit block on the drum is a generally annular cylindrical bit holder mounting portion 51 having a central bore 52 positioned therethrough from a top surface 53 to a bottom distal portion 54 of the bit block 20. Adjacent the bottom portion 54 and opposite the mounting portion 47 is a slot 55 which increases the accessibility of a tool to the rear of the bit block and into the bore 52 of the bit block 20 at the rear 54 thereof. Also, immediately above slot 55 is a cylindrical bore 56 which may have a pin (shown in Fig. 3 and 5 at 56a). Pin 56a extends into the slot 44 of the bit holder, thus preventing rotation of same when mounted in the bit block. As is evident from the exploded view, the shank portion 41 of the bit holder 18 is press fit into the bore 52 of the bit block 20 and retained therein. Further, the spacer 17 and the shank portion 25 of bit 16 are mountable through the front end 35 of the bit holder 18 and are retained therein by C-shaped retainers 26 and 32. Additionally, the spacer is retained in its mounted position by pin 45.

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Referring to Fig. 2, the mounting relation between the bit block 20, bit holder 18, spacer 17 [19] and bit 16 is shown in cross section. Fig. 2 is modified from a straight cross section of the assembly as shown in Fig. 1 in that the slot 44 of bit holder 18 and the slot 55 of bit block 20 are not seen so that the mounting relation between the bit block and bit holder may be shown in more detail. Additionally, the upper shoulder 42 of the bit holder is not shown so that the relationship between the lower shoulder 42a and the bit block bore 52 may be shown.

At the rear of the bulbous frustoconical portion 73 is the cylindrical base 76. In one important aspect of the present invention, the base 76 [75] includes a rectangular notch 77 that extends radially inwardly from the outside of the circumference of cylindrical base 76 and is also in communication with the back face 76a of the cylindrical base. When the bit holder 70 is mounted in the bit block, such as 20, notch 77 will allow access of a tool therein to provide a prying method for removing the bit holder from the bit block. This is especially important if, for some reason, access to the back of the bit holder is not obtainable. A prying tool positioned in notch 77 would provide for removal of the bit holder out of the bit block until after the upper shoulder 78 of shank portion 79 is free of the top of the bit block, thus easing removal of the bit holder from the bit block.

Referring to Figs. 10 and 11, a fourth embodiment of the bit holder of the present invention, generally indicated at 80 is a steel nosed bit holder similar to that shown in Fig. 1, i.e., a bulbous style frustoconical nose bit holder, with the exception that the notches 82, 83 are round in outline rather than rectangular as shown in the first embodiment 18. The frustoconical portion at the front of the bit holder 80 includes the cylindrical nose 84, bulbous frustoconical portion 85 and cylindrical base 86. Rearwardly of the base, the shank portion 87 includes an upper shoulder 88 similar to that shown in the first embodiment. However, the remainder of shank 87 differs from the shank 41 of the first embodiment in two ways. First, instead of having a slot extending from the edge of upper shoulder 88 to the distal end 89 of the shank, the fourth embodiment of the present invention includes a pair of diametrically opposed slots 90-90a from the upper shoulder 88 to the forward edge of the distal end 89 such that the distal end 89 is still annular in shape rather than C-shaped as in the first embodiment 18. The second difference in the shank portion between the first embodiment and the fourth embodiment, is that the lower shoulder portion 91 is moved forwardly on the shank to be at a position to bisect the opposed slots 90-90a. In this embodiment, the pair of opposed slots take away stiffness from the annular shank such that the lower shoulder portions 91 are resilient similar to the lower shoulder portion 42a of the first

embodiment even though the distal end 89 of the shank is continuously circular or annular in shape. The press fit of the lower shoulder 91 in the bore 52 of the bit block 20 is similar to that of the lower shoulder 42a of the bit holder 18 in that it is a greater interference fit than that found in typical male-female member press fits, thus providing for ease of secure mountability of the bit holder 80 in the bore 52 of bit block 20. As with the other embodiments, no nut or retainer is necessary to hold the bit holder in the bit block. Also, pin 56a fits in either of the slots 90-90a.

Referring to Fig. 12, a tool for aiding removal of the bit holder 18 from the bit block 20 is generally indicated at [90] 95. Tool [90] 95 includes an elongate bolt [91] 98 having a hex head [92] 96, a shank [93] 100 that extends through the bore 36 (Fig 1) of the bit holder 18 and out the distal end 43 thereof where a hex head nut [94] 99 may be turned on the threads [95] at the distal end of the shank portion [93] 100 of bolt [91] 98. An enlarged radially extending flange [96] 101 has a central bore [97] 102 through which the bolt shank [93] 100 is passed prior to inserting the bolt through the bit holder bore 36 (Fig 1). The large flat surface [96a] 101 on the rearward side of annular flange [96] 101 provides ample room for positioning the tool thereagainst or striking a hammer thereto to remove the bit holder 18 from the bit block 20 without needing a large amount of access to the rear of the bit block 20 other than room to fit nut 99.

Abstract of the Disclosure

An improved bit assembly for road milling, mining, and trenching equipment includes a streamlined tip assembly that is a combination of conical and cylindrical in shape and devoid of protrusions or annular indentations that might impede the flow of removed material over and around the bit assembly or provide space for removed material to become clogged or imbedded on the tip assembly. [The portion of the bit block which mounts on a drum cylindrical spacer that allows a bit removal tool access to the bottom of the assembly to aid in bit removal] The assembly further includes a generally cylindrical spacer that allows a bit removal tool access to the bottom of the assembly to aid in bit removal.

13. (currently amended) A bit assembly for use in road milling equipment of the type including a bit, a bit holder including a first central bore in which a shank of said bit is mounted, and a bit block including a second bore in which said bit holder is mounted, an improvement comprising:

a cylindrical spacer shaped substantially identical to a shape of said shank on said bit, said cylindrical spacer being mountable in said first central bore between a distal end of said bit shank and a bottom end of said bit holder, a bottom of said cylindrical spacer providing indent means for receiving a bit removing tool thereon in close approximation to said bottom of said bit holder for aiding in removing said bit from said bit holder, and

[12. The bit assembly as defined in claim 11 wherein]

said bit holder further includes means in communication with said first central bore for preventing said cylindrical spacer from exiting said first central bore out said bottom of said bit holder.

14. (currently amended) A bit assembly for use in road milling equipment of the type including a bit, a bit holder including a first central bore in which a shank of said bit is mounted, and a bit block including a second bore in which said bit holder is mounted, an improvement comprising:

a cylindrical spacer shaped substantially identical to a shape of said shank on said bit, said cylindrical spacer being mountable in said first central bore between a distal end of said bit shank and a bottom end of said bit holder, a bottom of said cylindrical spacer providing means for receiving a bit removing tool thereon in close approximation to said bottom of said bit holder for aiding in removing said bit from said bit holder,

said bit holder further includes means in communication with said first central bore for preventing said cylindrical spacer from exiting said first central bore out said bottom of said bit holder,

said means for preventing said cylindrical spacer from exiting said first central bore out said bottom of said bit holder including:

an elongate axially oriented slot in communication with a cylindrical sidewall of said cylindrical spacer positioned mediate a top and said bottom thereof,

a radially extending bore through an annular sidewall of said shank on said bit holder, and

a cylindrical pin mounted on said radially extending bore and extending into said elongate axially oriented slot on said

cylindrical spacer for limiting the sliding movement of said
cylindrical spacer in said bit holder central bore [.] and

[14. (original) The bit assembly in claim 13 wherein]
said elongate axially oriented slot includes at least a
portion thereof having a depth greater than a length of said
cylindrical pin for accepting said pin when it is desired to
remove said cylindrical spacer from said bit holder central bore.